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A CONTRIBUTION TOWARD A KNOWLEDGE OF THE GENUS WASHINGTONIA

S. B. PARISH

(WITH TWELVE FIGURES)

"We followed the sandy bed of the Carriso nearly all day at a snail's pace, and at length reached the 'little pools,' where the grass was luxuriant, but very salt. This valley is at no point more than half a mile wide, and on each side are mountains of gray granite and pure quartz. A few miles from the spring called 'Ojo Grande,' at the head of the creek, several scattered objects were seen, projected against the cliffs, hailed by the Florida campaigners, several of whom were along, as old friends. They were cabbage trees, and marked the *locale* of a spring, and a small patch of grass."

In these words we have the record of the discovery of the Washington palm. The date was November 28, 1846, and the discoverers were the party of the military reconnoissance under Major W. W. EMORY, now nearing the end of their long journey, through unexplored mountains and arid deserts, from the Missouri River to San Diego.

Seven years later a company of surveyors under W. P. BLAKE, engaged in exploring a route for the projected Pacific Railroad, entered the Colorado Desert through the San Gorgonio Pass, on their way to Fort Yuma, the route now followed by the Southern Pacific Railway. On November 15, 1853, they reached a little nook, nestled under the shadow of rugged San Jacinto Mountain, which afterward came to be known as Agua Caliente, and more recently as Palm Springs. "A growth of rushes," says the itinerary, "forms a narrow margin of green vegetation around the spring and its outlet. Willows and mesquite bushes grow there also, and I found a young palm tree, spreading its broad, fan-like leaves among them. The surrounding desert and the palm tree gave the scene an oriental aspect." Hidden in nearby canons were groves of some of the noblest palms of the whole desert region, but the travelers passed on unaware of their presence.

Dr. C. C. PARRY has recorded (**'81**) that he also became acquainted with the desert palms in 1849–1850, while botanist of the Mexican Boundary Survey. But in the introduction to the *Botany* of the boundary he made no mention of these notable trees, while enumerating so many of the remarkable plants of the Colorado Desert. Neither do they find a place in the body of the volume; nor are they mentioned by the botanists who reported upon the collections of the Pacific Railroad Surveys.

Not until 1861 did they receive botanical recognition, and was an attempt made to assign them a systematic position. In that year Dr. J. G. COOPER published (Smithsonian Report for 1860) the names of certain trees "omitted, by an oversight, from a list of those on the Mexican boundary" which had appeared in a preceding report. Last on the list appears "Brahea? dulcis? Mart." COOPER had leaves, collected, he states, by Dr. SUTTON HAYES, at Palm Springs[1] and he notes their thready segments and prickly petioles, and states that the fruit is edible.

The matter rested here for eleven years more, when the attention of European botanists was attracted to some young palms grown at Ghent, by the enterprising house of LINDEN, from seed reported to have come from the arid interior of our Pacific coast. At first they were thought to belong to Brahea or to Prichardia, but in 1879 Dr. H. WENDLAND, the most eminent palmographer of the time, became convinced of their generic distinctness, and gave the name Washingtonia, "in honor of the great American," to the palms which, he says, had been known in gardens as *Brahea* or *Prichardia filifera.*

THE GENERIC NAME

It appears, however, that there had been some previous suggestions as to the bestowal of the name of Washington upon certain other plants. A Dr. WINSLOW had proposed that the Californian Sequoias might fitly bear that honored name. For this reason SUDWORTH, in 1897, proposed ('97) to substitute for WENDLAND's name the cacophonous chloronym *Neowashingtonia*. In this he has been followed by some American nomenclaturists, but not by European palmographers.

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[1] Probably not the Palm Springs of BLAKE'S Report. Dr. HAYES accompanied as assistant surgeon the government expedition which in 1858–59 surveyed an emigrant route from El Paso to Fort Yuma. Later he made some botanical collections near San Diego, and probably traveled to that town from Fort Yuma by the same road taken by EMORY'S party, the customary route at that time. This "Palm Springs" may well have been that of EMORY. There is a sketch of Dr. HAYES'S life in Seeman's Jour. Bot. **1**:254. 1863, and substantially the same account in Biologia Cent.-Am. Botany **4**:153.

In the same year BRITTON and BROWN[1a] transferred the umbelliferous plants commonly known as Osmorrhiza to *Washingtonia* Raf., a disposition subsequently accepted, with confessed reluctance, by COULTER and ROSE.[2]

It would seem evident that one of the leading principles which should govern, if a stable nomenclature is to be attained, is that the code should not be interpreted in the interest of novelty. Changes of name should be made only on clearest evidence of their necessity, and in all cases of reasonable doubt the name in possession should be left undisturbed. Tried by this standard it does not appear that either of these proposed changes is justifiable. WINSLOW's alleged publication is valid neither in its character nor in its vehicle. It occurs in the course of a rambling popular account of a visit to the Sierra Nevada, published in the *California Farmer* of August 24, 1854, a farmer's weekly of the ordinary type. Possibly the original defect might be considered to have been cured by the quotation of some paragraphs of WINSLOW's letter in an article on "The big tree," by HOOKER,[3] and by CARRIÈRE's citation in the synonymy under *Wellingtonia gigantea*.[4] In any event, Washingtonia as a name for the Sequoias lapsed at once into hopeless synonymy, leaving it, under the International Rules of Botanical Nomenclature, open for subsequent use.

The facts in the other case are these. In 1818, in a review of PURSH's *Flora*, RAFINESQUE remarks that, in his opinion, *Chaerophyllum Claytoni* Pers. had been incorrectly referred; and he continues: "Several names have been proposed for it, Washingtonia, Osmorrhiza, Gonantherus, but these are not yet published; the second

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[1a] BRITTON and BROWN, Ill. Fl. 2:530. 1897.

[2] COULTER and ROSE, Monog. Umbell. Contrib. U. S. Nat. Herb. 7:61. 1900.

[3] HOOKER, Jour. Bot. and Kew Garden Misc. 7:26 *et seq.* 1855.

[4] CARRIÈRE, Traité des Conifères, Ed. 2, 217. 1867.

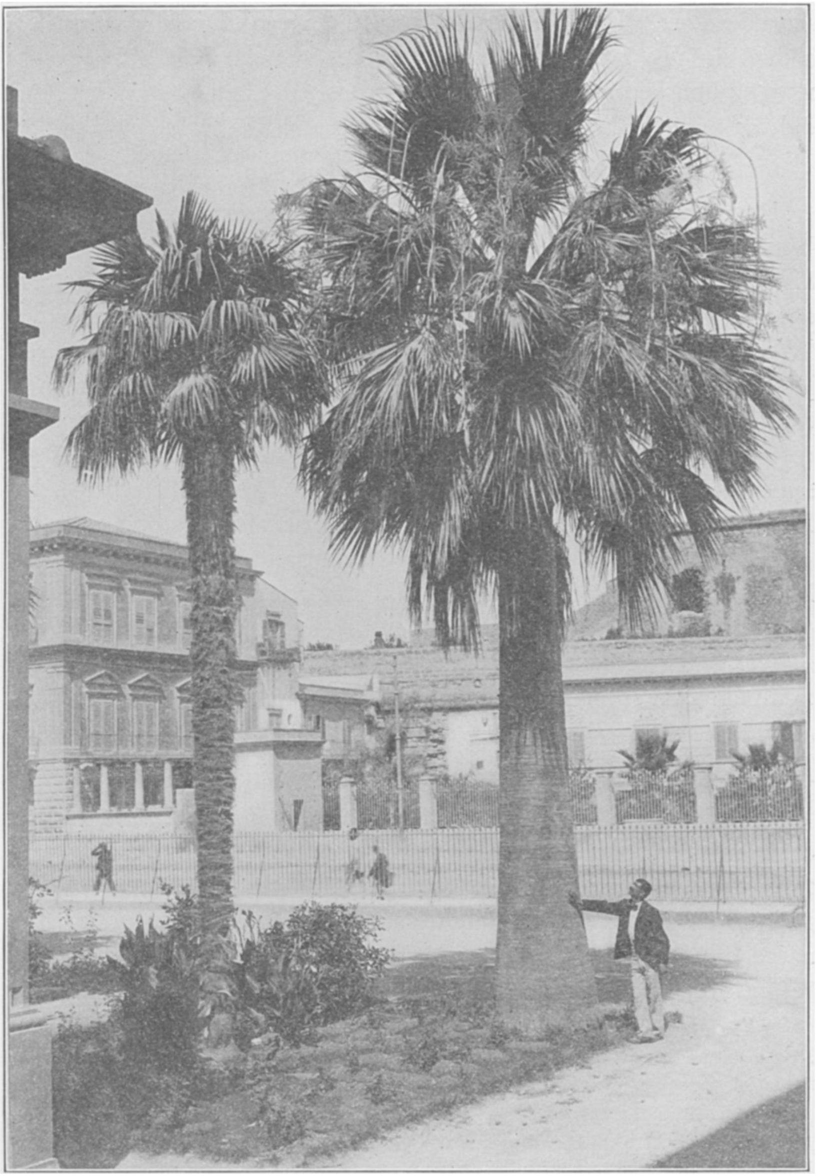

FIG. 1.—*W. filifera* Wendl. (the right-hand tree) in the Botanical Garden, Palermo, Italy.

is perhaps the best,"[5] and in the following year he did *publish* this second name.[6] In order that we may be enabled to make a confusing change in two familiar names, therefore, we must hold that RAFINESQUE published a name when he expressly disclaimed so doing, and did not publish it when he formally undertook the task.

NAME OF THE TYPE SPECIES

Here it is convenient to consider another nomenclatural question. WENDLAND'S original species was published as *W. filifera;* but in his *Revisio*, KUNTZE (**'91**) proposed to change it to *W. filamentosa*, on the ground of priority, citing in support "*Brahea filamentosa* Wendl. in Cat. Haage & Schmidt (1875), *Prichardia filamentosa* Wendl. ex Fenzi in Bull. Soc. Tosc. (April, 1876)." To seek in a tradesman's catalogue for a pretext for displacing an established name, requires a lust for change almost amounting to a mania. But if an appeal to trade-lists is to be made, priority is against the change, for HAAGE and SCHMIDT offered *Brahea filamentosa* in their autumn catalogue of 1875, but in the spring of the same year LINDEN in his list had put the same plant on the market as *Prichardia filifera* (FENZI **'76**). *Prichardia filamentosa* of FENZI'S paper is a *nomen nudum*, being without a word of scientific description, or any reference to a published species. As the proper specific name, *filamentosa* has absolutely no standing.

THE SOURCE OF WASHINGTONIA FILIFERA

When we pass from the consideration of names, we find ourselves confronted by questions of greater difficulty. What precisely was the palm variously known to gardeners and seed-dealers as *Brahea filifera* or *Prichardia filamentosa*, and to which WENDLAND gave the name *Washingtonia filifera*, and whence came it? WENDLAND had before him a few[7] young trees which had been grown in the palm-

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[5] Am. Month. Mag. **2**:176. 1818. This publication is invalid under the Laws of Nomenclature formulated by the Botanical Club of the A. A. A. S. See Canon 12 of the latest revision of that code, in Bull. Torr. Bot. Club **34**:171. 1907.

[6] Jour. Phys. **89**:257. 1819

[7] There could have been but few of these trees, for, in a letter to the writer, M. LUCIEN LINDEN, the present head of the house, writes: "Vers 1872 mon père a reçu d'un dizaine des graines de ce palmier qu'il avait rapporté d'un voyage en Californie." In his original description WENDLAND states that it was introduced by LINDEN in 1869, but this is evidently an error.

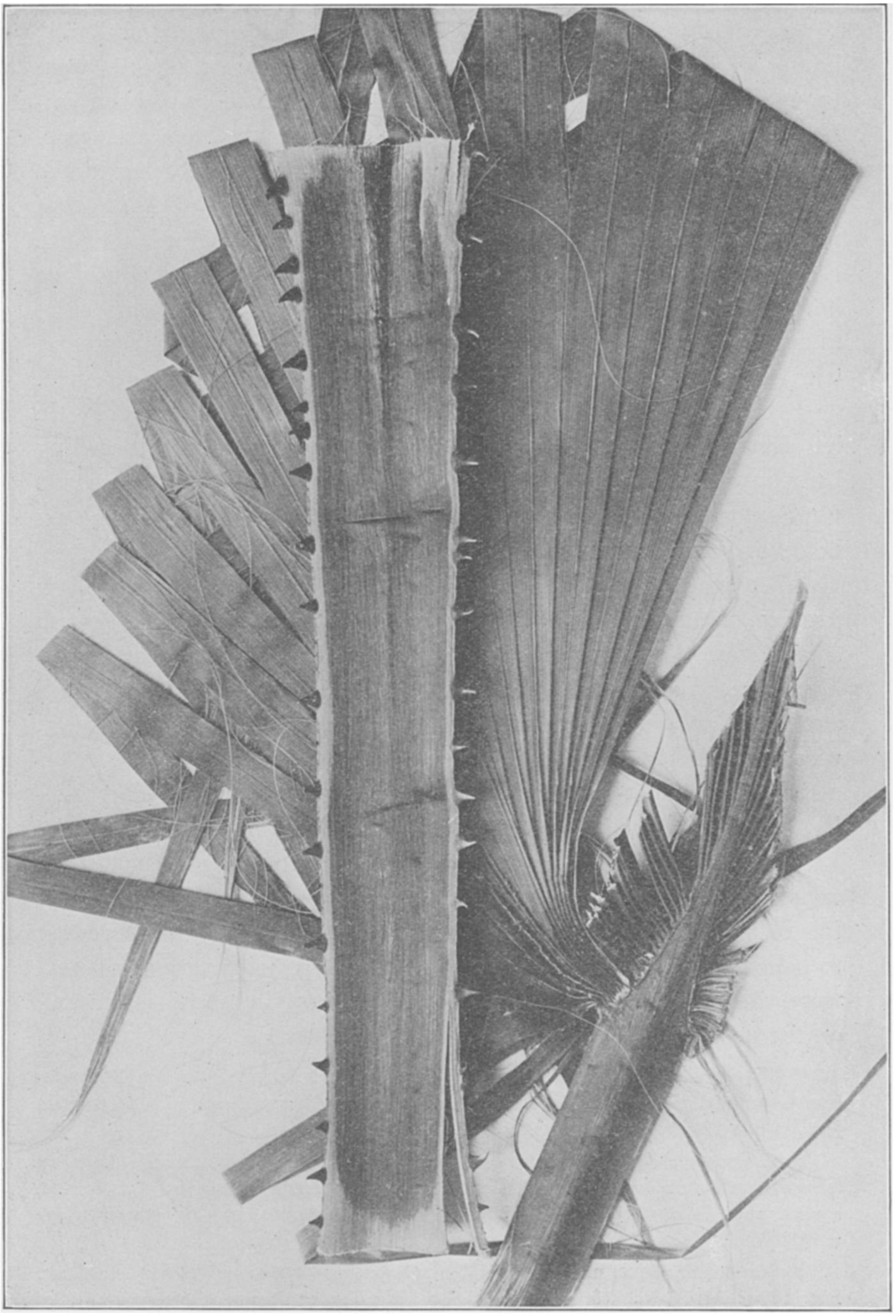

FIG. 2.—A leaf from the tree shown in *fig. 1*.

houses of LINDEN in Ghent. It seems certain that the seeds were brought to Europe by ROEZL.[8] They purported to have been collected in Arizona, near the Colorado River, and FENZI ('76)[9] even gives latitude and longitude, which would locate the parent trees in the neighborhood of Prescott, Arizona, a region rather of pines than of palms. Definite as are these statements, it is impossible that ROEZL ever could have seen a Washingtonia growing spontaneously or have collected its seed. The seeds which he carried to Europe he must have received from another, probably in San Francisco, and with them an inaccurate or misunderstood account of their source.

ROEZL appears to have made but a single visit to America. He left Europe in August 1872, landing at New York, and proceeding by way of St. Louis to Denver, where he made his headquarters. On September 6 he wrote from that place that he had sent home six boxes of *Yucca angustifolia*, some cactuses, and bulbs of Calochortus. He then made a trip, of a fortnight's duration, into northern New Mexico, where he saw *Abies concolor*, *Yucca baccata*, and *Ipomoea leptophylla*. On October 3 he wrote from San Francisco, telling of his route, by the Union and Central Pacific Railways, through Utah and Nevada. He remained in San Francisco until about November 1, when he sailed for Panama.[10]

The early reports of the location of the parent trees proving unreliable, we are left without any authentic information as to the source of LINDEN'S seeds. They may have come from native trees in the region now known to be occupied by these palms, or from some of the older cultivated trees in southern California. There is reason to believe that some of the earliest subsequent importations of seed were collected by the late GEORGE W. DUNN in Cantillas Cañon, on the desert borders of northern Lower California.

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[8] "Es ist nämlich von RÖZL, in Nord-Mexico, bei Arizona, am Rio Colorado, eine Corephine gesammelt worden, welche unter dem Namen *Prichardia filamentosa* jetzt in den Handelgärten gezogen wird" (DRUDE '76).

[9] "La scopeta di questa Palma se debba all' intrepide B. ROEZL, che l'aviabbe retrovata nell' Arizona (Stati Uniti), dove cresca spontanea sulle rive del Colorado, a circa 115° de longitudine ouest del meridiano de Parigi, e circa de 35° latitudine nord."

[10] Notices of ROEZL may be found in Gartenflora **1874**:49; **1889**:330; Jour. Bot. **1874**:384; Gard. Chron. **2**:521. 1889. He died at Prague, October 14, 1889. at the age of 61 years.

WASHINGTONIA ROBUSTA

If we turn from this fruitless attempt to trace the indigenous origin of WENDLAND'S *W. filifera* to his description of that plant, we find it unsatisfactorily vague, as is also the later characterization of his second species, *W. robusta;* while among writers and cultivators there exists great confusion and misapprehension as to the identity of the two species.

This second species WENDLAND ('83) founded on young plants grown by VAN HOUTTE at Ghent, and its ascribed indigenous source is manifestly apocryphal, since it was asserted to be "the borders of the Sacramento River." VAN HOUTTE received the seeds under the name of the species already known, and under that name their product was at first sold, until WENDLAND recognized them as distinct, and published the name *W. robusta* (ANDRÉ '95).

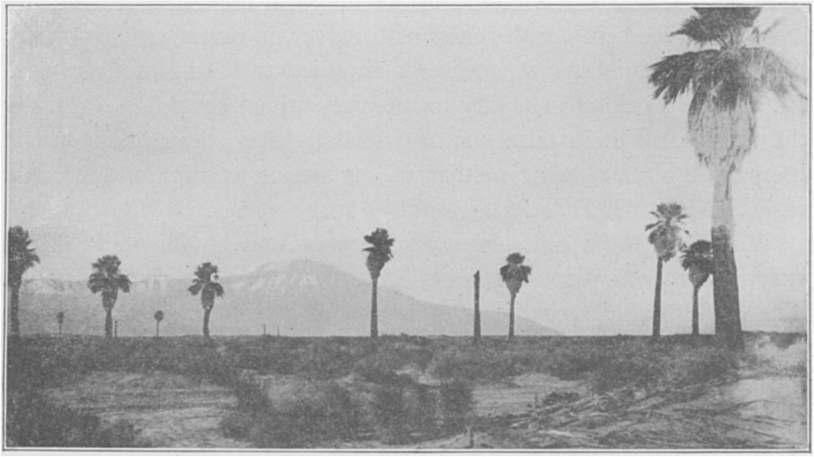

FIG. 3.—*W. filifera* var. *robusta* (Wendl.) Parish; very old trees at the western margin of the ancient lake bed, Colorado Desert.

It is significant that about this time collectors began to secure palm seed at Palm Springs, in the Colorado Desert. I am convinced that this place was the true source of WENDLAND'S second type. Certain it is that the trees growing there are identical with those now recognized in Europe as representing that species. It was on material from this station that WATSON ('80) based his characterization of the genus and of *W. filifera*, the first formal and satisfactory description of either genus or species.

CONFUSION RESPECTING THE SPECIES

From what has now been stated it will be understood that confusion might readily arise as to the identity of these two species. Each was insufficiently described from young plants growing under glass; and the indigenous source of each was either misapprehended or misrepresented. Added to this is the undoubted fact that soon after the publication of the second species, certain dishonest dealers were accustomed to fill orders for either from the same drawer, the only difference being in the price. Moreover, in recent years, through honest misunderstanding, the seeds supplied to the market as "true *W. robusta*" belong in reality to an undescribed species. Naturally the product of these falsely named seeds adds to the confusion. It happens, therefore, that neither of the palms known in California as *W. filifera* and *W. robusta* bears its true name.

A clue in these difficulties would be found could we ascertain exactly what was Wendland's *W. filifera*, but this seems impossible. The only practical course is to accept as representing this species certain mature trees growing in the Riviera, which are recognized by European authorities as authentic specimens of Wendland's two palms. They are distinguished by a character which does not appear in either of the original descriptions, and one too marked, it would seem, to have been overlooked. Yet in the native groves of the desert, where it is to be seen, it has been overlooked by the many accomplished botanists who have visited them. While not entirely satisfactory, this seems the best disposition attainable, and I have adopted it in the following key, which represents my present understanding of the genus.

KEY TO WASHINGTONIA

Petiole acuminately prolonged in the blade.
  Blade abundantly filiferous.
    Margins of the petiole unarmed near the blade......1. *W. filifera.*
    Margins of the petiole armed throughout........1*a*. *W. filifera robusta.*
    Margins armed only near the base........1*b*. *W. filifera microsperma.*
  Blade destitute of filaments or nearly so..................2. *W. gracilis.*
Petiole obtuse at junction with the blade.........................3. *W. sonorae.*

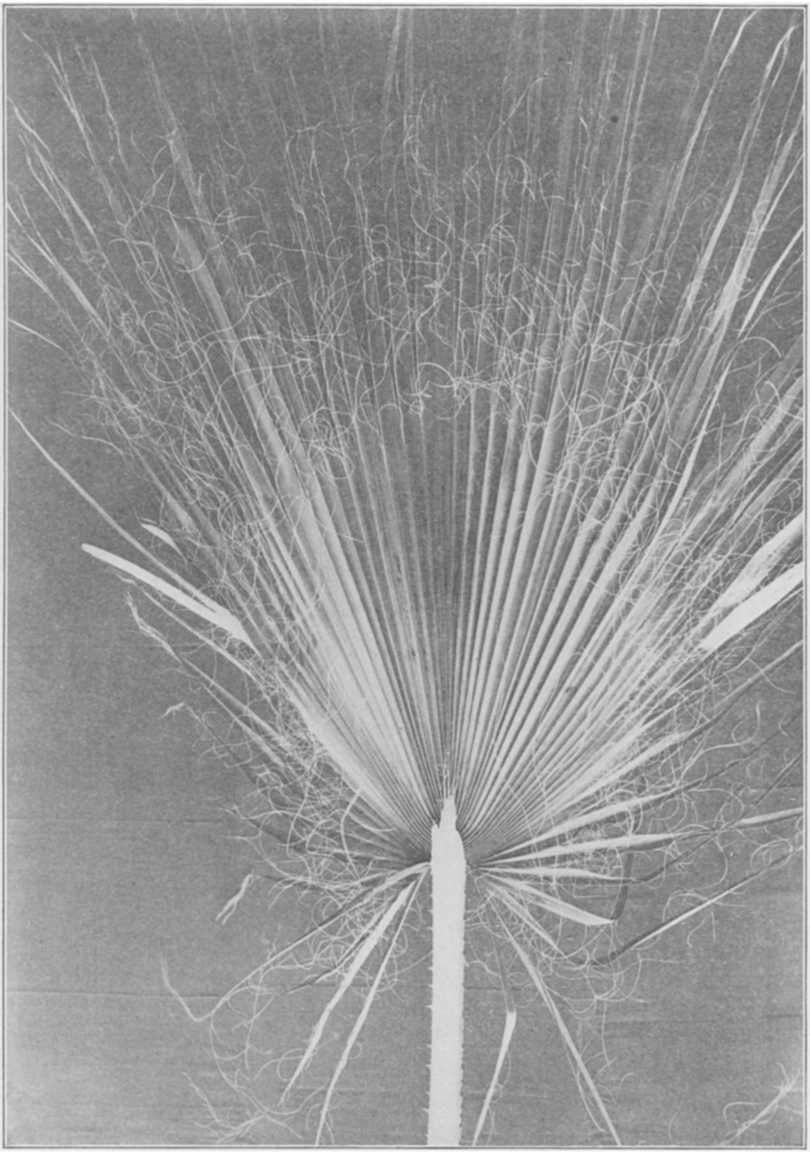

FIG. 4.—Leaf of *W. filifera robusta*, from a cultivated tree at San Bernardino, California.

1. **Washingtonia filifera** Wendland, Bot. Zeit. **37**:68. 1879.—*Figs. 1, 2.*

Margins of the petioles armed to the middle, or somewhat higher, naked above; otherwise as in the following variety, so far as known.

There seems to be no reason for selecting this form as representing Wendland's species except that European palmographers so regard trees having this character which are growing in the Riviera. There are some trees thus armed growing in the native groves at Palm Springs, and they appear not to differ otherwise from the fully armed ones. In the same groves there are also young palms, probably five or six years old, having petioles without the usual corneous margin, and armed only with weak prickles, or nearly destitute even of these. No mature trees of this kind were seen. A similar difference is

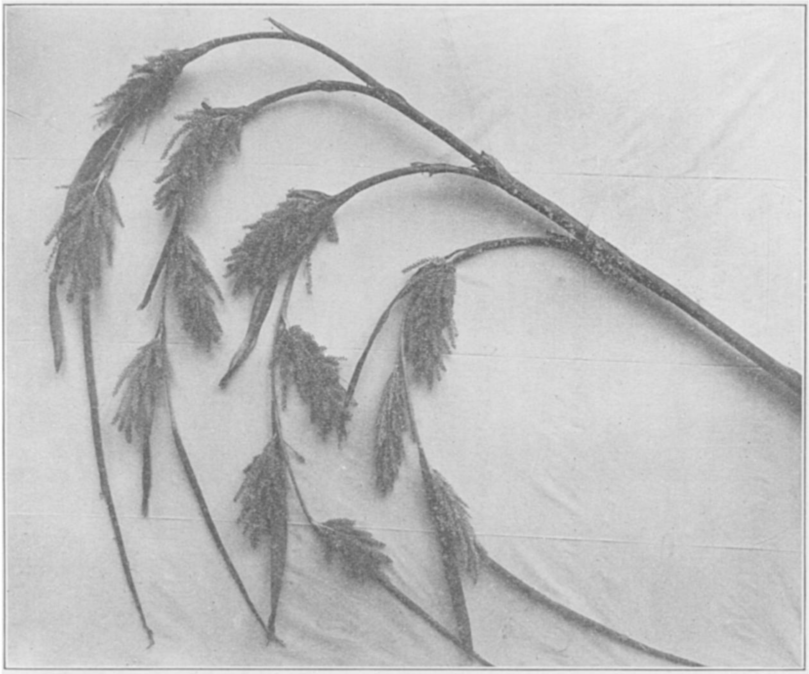

Fig. 5.—Panicle, in full flower, of *W. filifera robusta*, from a cultivated tree at San Bernardino.

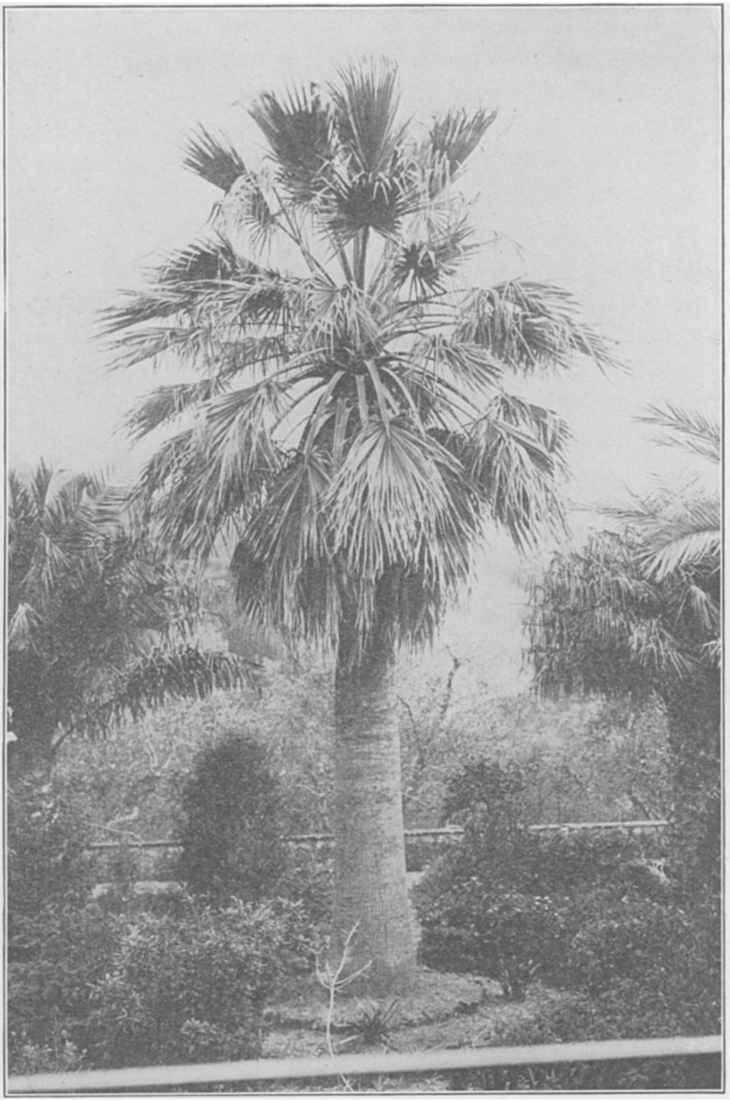

FIG. 6.—*W. filifera* var. *microsperma* Beccari; in the gardens of Count Parravicino, Campo Romano, near Viareggio, Tuscany. This tree was planted in 1878, when 4–5 years old, and flowered for the first time in 1902.

reported in the armature of the petioles of *Erythea edulis*, some trees having naked petioles, while others show rudimentary spines.

1a. WASHINGTONIA FILIFERA Wendl. var. **robusta,** n. comb.—*W. robusta* Wendland, Garten Zeit. **2**:198. 1883; *W. filifera* S. Watson, Bot. Cal. **2**:211, 485. 1880, and of American gardens; *W. filamentosa* Kuntze, Rev. Gen. Pl. **2**:737. 1891; Sargent, Sylva **10**:47. *pls. 5–9.* 1891; *Neowashingtonia filamentosa* Sudworth, U. S. Dept. Agr., Div. For., Bull. **14**:105. 1891.—*Figs. 3–5.*

Trunk stout, enlarged at the base, 20–27^{m} tall: petioles stout and until old erect, 1–1.5^{m} long, 1–1.25^{dm} wide at the dark-brown base, and one-half as wide at the blade; the upper surface concave, its thin, light-brown margins corneous and armed for their entire length with stout hooked spines, acuminately prolonged into the blade; ligule papyraceous, acuminate, lacerate, 2–5^{cm} long; blades 1–1.5^{m} in diameter, the 60–70 folds deciduously tomentulose on the lower edges, cleft two-thirds to the base, the margin of the divisions abundantly filiferous: panicle declined, exceeding the leaves, the primary branches 4–5, each bearing 2–5 separated thryses, which are exceeded by their ligulate, chartaceous, spathoid bracts; infloresence dense, but becoming diffuse in fruit: seed excavated on the raphal face.

Borders of the Colorado Desert of southern California, at low altitudes, seldom exceeding 350^{m}.

The flowers and fruit have been well described by WATSON. The flowers are copiously nectariferous, and exhale a heavy odor, disagreeable when near by, but when diffused somewhat suggestive of the perfume of orange blossoms.

1b. WASHINGTONIA FILIFERA Wendl. var. **microsperma** Beccari in litt., n. var.—*Figs. 6, 7.*

"A smaller tree, margins of the petioles armed only at the base." Differing in these respects only from the preceding.

Growing in the Riviera, but as yet not noticed in the natural groves.

2. **Washingtonia gracilis,** n. sp.—*W. robusta* of California gardens, not of WENDLAND.—*Figs. 8–10.*

Trunk slender, at least 20^{m} tall: petioles rather convex on the upper surface, 7–10^{dm} long, about 1^{dm} wide at the brown base and one-half as wide at the blade, the corneous margins armed with short hooked yellow spines for the entire length, acuminately prolonged in the blade; ligule papyraceous, narrow, the margin entire; blade

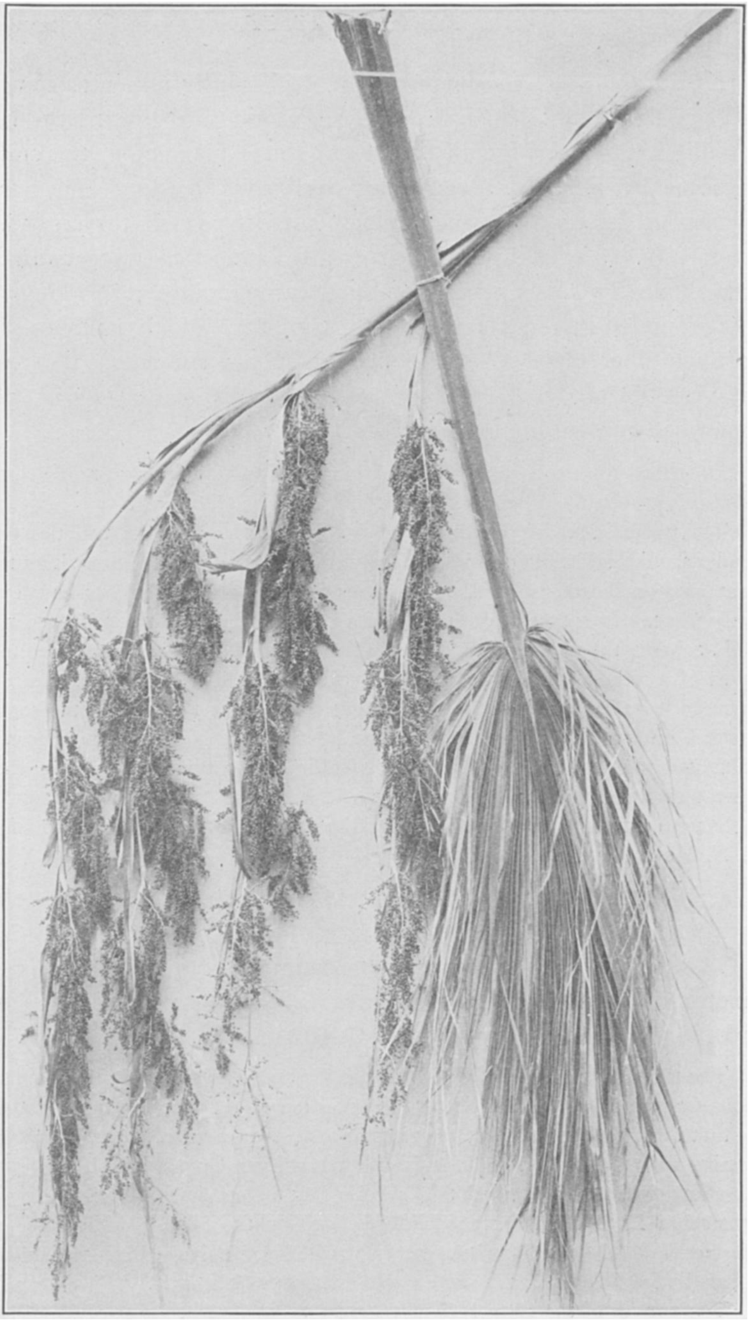

FIG. 7.—Leaf and very young fruit of *W. filifera microsperma;* from a tree in the gardens of Marquise Corsi, Sesto, near Florence, Italy.

8–10^{dm} in diameter, the folds 75–80, deciduously tomentose toward the base beneath, cleft little more than one-third toward the base, not filiferous except for an occasional single filament in the sinuses of some of the folds: peduncles declined, exceeding the leaves; primary divisions 6–8, each bearing 5–10 separated thryses, which are mostly exceeded by their narrow, deciduous, chartaceous bracts; flowers nearly sessile: calyx tubular-campanulate, 3^{mm} long, the short rounded lobes lacerate: tube of corolla 3^{mm} long, its lobes erect, narrowly lanceolate, 6–7^{mm} long: filaments subulate, 3^{mm} long, the versatile anthers 4^{mm} long: seeds broadly ovate, 6–7 by 5^{mm}, somewhat rugose on the raphal face.

Described from cultivated trees growing in San Bernardino and Riverside, California; probably indigenous in northern Lower California.

This palm is readily distinguished from *W. filifera* and its varieties by its slender trunk and smaller and less deeply divided leaves, which are without filaments and on shorter petioles. It is a tree of rapid growth and has been extensively planted in recent years in southern California, under the mistaken name of *W. robusta*, the true *W. robusta* being known as *W. filifera.* According to the report of a reliable dealer, the seed from which the older trees were grown was procured from indigenous groves in canons, running to the sea, on the coast of Lower California, somewhere between the international boundary and Ensenada. Cultivated trees, which now have been fruiting for a number of years, are the present sources of the commercial seed. Much has been gathered from two noble trees, among the oldest in cultivation, which ornament the lawn of Mr. D. W. McLeod, of Riverside.

4. WASHINGTON SONORAE Watson, Proc. Am. Acad. **24**:79. 1889; **25**:136. 1890.—*Fig. 11.*

This species is readily separable from the others by the obtuse juncture of the petiole with the blade. I have seen only young plants, and their leaves are very abundantly filiferous.

The type station is given by WATSON as "in secluded cañons in the mountains about Guyamas." Dr. E. PALMER, the collector of the type specimens, informs me that the trees grew "in great quantities, and of great size, in the deep cañons running into the Gulf of California, far away from Guyamas." Dr. WATSON subsequently identified as of this species certain specimens collected by Dr. PALMER at La Paz, in Lower California, and on the opposite side of the gulf. The trees in cultivation have been grown, probably exclusively, from seed collected in San José del Cabo, in the same region of Lower California.

The natives of the Cape region recognize three distinct forms of *W. sonorae.* Two of these—"Palma Blanca" and "Palma Colorada"—are distinguished by

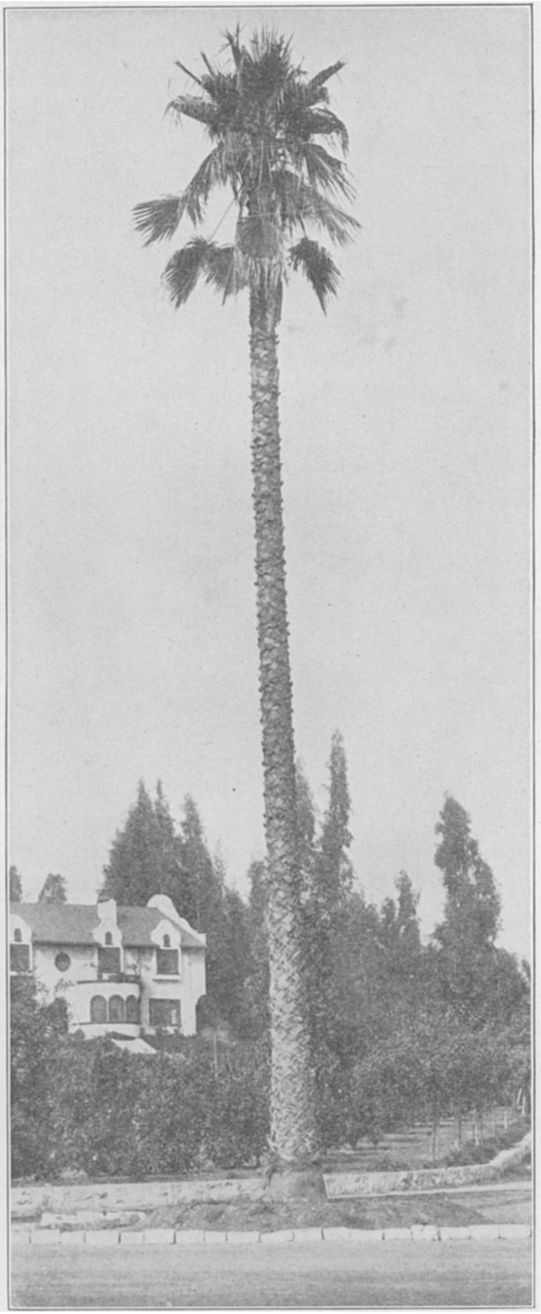

FIG. 8.—*W. gracilis* Parish; Victoria Avenue, Riverside, California. This tree is about 25 years old and 18^{m} high; its circumference at 5^{dm} from the ground is 15.75^{dm}; the leaves have been removed from the trunk.

the white or red color of the woody fiber of their trunks. The third—"Palma Nigra"—is said to be a smaller tree, growing at higher altitudes, where winter snows are not infrequent. Dr. FRANCESCHI, to whom I am indebted for this information, has grown many plants, at Santa Barbara, from seeds of each of these forms, but finds no differences in the young trees, nor am I able to detect any in the specimens he has kindly sent me.

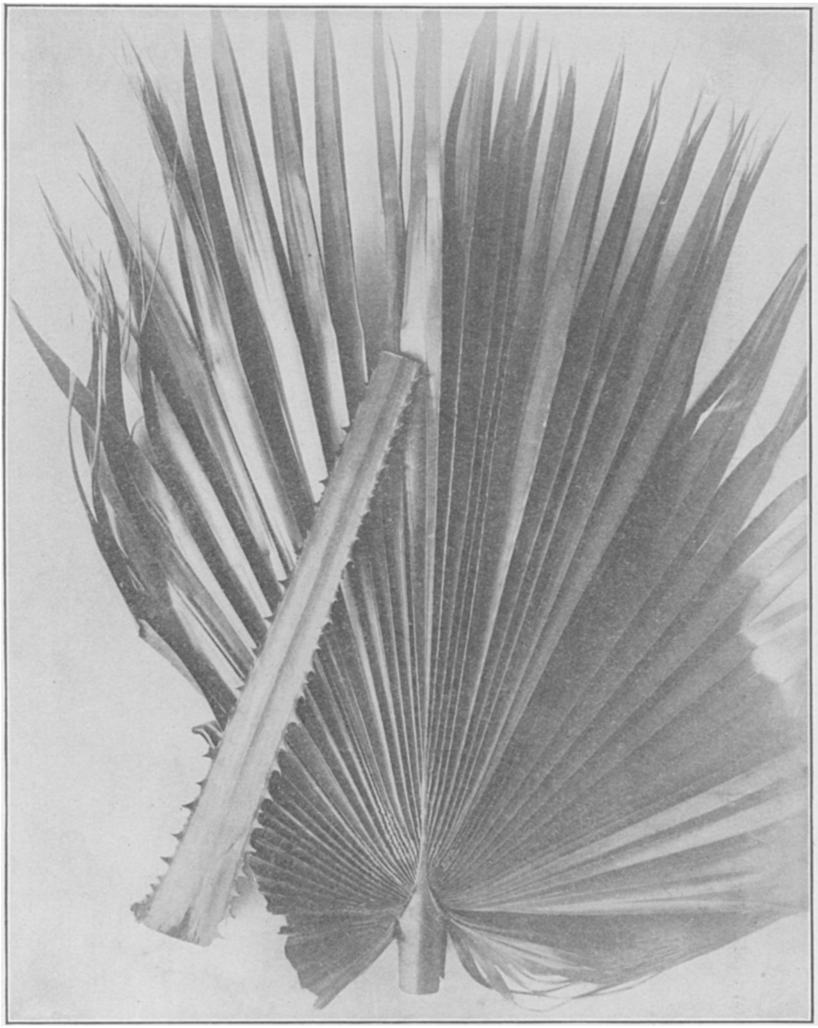

FIG. 9.—Leaf of *W. gracilis*, from a tree at the Santa Fé railway station, San Bernardino, California.

FRUIT AND SEED OF WASHINGTONIA

The fruit of Washingtonia is a small oblong drupe, black at maturity, with a thin, sweetish, rather dry pulp. The seed is brown, oblong to oblong-ovate, flattened, excavated or somewhat wrinkled on the raphal face. The first of these raphal characters seems to belong to *W. filifera* and its variety *microsperma*, the second to *W. filifera robusta* and *W. sonorae*, and the last to *W. gracilis*. To determine whether these characters are constant requires the study of extensive series of authentic seeds from varied sources. For this the material is not at hand. *Fig. 12*, for which I am indebted to Dr. Beccari, represents the seed as at present understood.

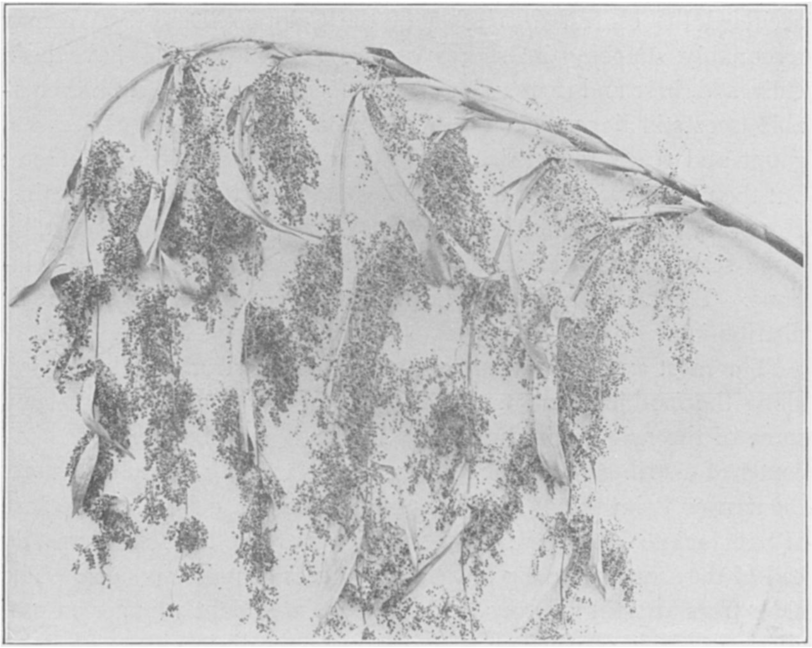

Fig. 10.—Panicle of *W. gracilis*, just setting fruit, from a tree on the lawn of Mr. D. W. McLeod, Arlington Avenue, Riverside, California.

ADDITIONAL NOTES ON W. FILIFERA ROBUSTA

Wendland's *Washingtonia robusta*, long considered an obscure if not, indeed, a mythical tree, is in reality the one with which we have the fullest acquaintance. The type source of *W. filifera* is unknown, the native home of *W. gracilis* remains unvisited, the haunts of *W. sonorae* seldom have been penetrated, but many botanists have stood beneath the groves of the desert *W. robusta*, and it has long been familiar in cultivation in southern California.

Distribution.—Its distribution appears to have been determined by the boundaries of the great lake which, in the not very distant past, occupied the central depression of the Colorado Desert. We may reasonably suppose the shores of this ancient lake to have been enlivened, here and there, with groves of stately palms. A few venerable trees still linger near the upper shore line of this vanished sea, gaunt and ready to perish, and without offspring to succeed them; but the most have retired to the cañons of the surrounding mountains. Here they find congenial homes along the few and feeble streams, by some scanty spring, or narrow oasis moistened by alkaline percolations. The necessity of soil moisture is the governing factor in their distribution.

The most extensive groves occupy a tract of strongly alkaline soil along the foothills some ten miles north of Indio, and extending up some of the neighboring washes. This belt may be considered the center of distribution. The finest grove occupies, for a mile or more, the narrow Palm Cañon, on the opposite side of the desert at the base of San Jacinto Mountain. Here hundreds of fine trees fill the sandy bed of the stream or cling to the rocky bases of its steep sides. The older trees are still vigorous, and there are abundant younger ones of all sizes. It is convenient of access from the little village of Palm Springs.

Most of the cañons at the desert bases of San Jacinto contain palms. A few grow in the cañon of the Whitewater, which is the western limit of the species. Its southern outpost is probably at Carrizo Creek; a few trees at Corn Springs mark its northern limit, and none are known east of Frink's Station.

Duration of the leaves.—It is seldom that one sees a desert palm, either indigenous or cultivated, that has not been marred by human agency. A naked trunk, crowned with living leaves, beneath which is a mass of dead ones deflexed, is not the natural aspect of the tree. The effete leaves, were they not artificially removed, would conceal

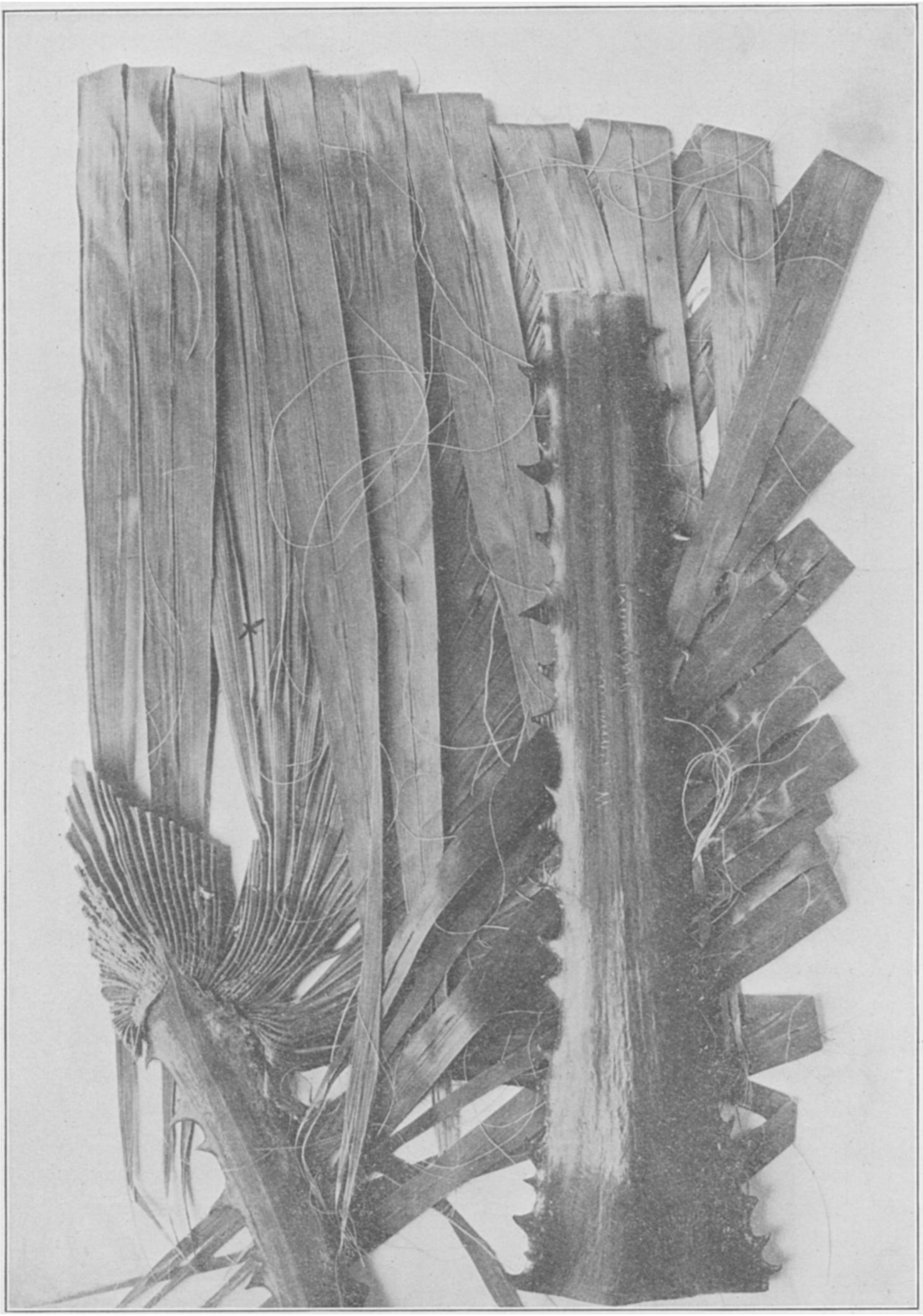

FIG. 11.—Leaf of *W. sonorae* S. Watson, from a tree in the Botanical Garden, Palermo, Italy.

the trunk, at least for the greater part of its length, beneath a gray thatch, an ideal protection against the parching air of the desert. The dead leaves are usually kept cut away from cultivated trees, while it is almost impossible to find mature indigenous palms from which the leaves have not been repeatedly burned. To so burn them was the immemorial custom of the desert Indians, and it has been erroneously alleged that in this they were influenced by a superstitious motive—the making of an offering by fire to the spirits of the dead. In fact their purpose was purely utilitarian, namely, to facilitate the gathering of the fruit, and, as they believed, to increase the fruitfulness of the trees. That the trees survive these repeated burnings is evidence of their wonderful vitality.

The functional life of a leaf is about one year. How long the dead leaves would remain attached to the trunk if undisturbed cannot be stated; probably for a very long period. There is a row of trees in San Bernardino fully 10^{m} tall from which the leaves have never been removed, and the lowest are over twenty-five years old and still firmly attached to the trunk. In a secluded nook of San Jacinto Mountain there is reported to be a group of three majestic palms, 20^{m} or more in height, whose trunks are clothed with a dense leaf-thatch from crown to base; their age cannot be less than a century. From the burned trees the leaves eventually fall off in great masses, the bases of the petioles seeming to have been violently wrenched loose, and not to have naturally separated, as with deciduous leaves.

Aboriginal uses.—The habitations of the desert Indians were mere shelters, but naturally palm leaves, when easily procured, were utilized in their primitive construction. Strands split from the leaves were convenient for tying, and it is said were sometimes used for the spiral coil with which they built up their baskets (MERRIAM :03).[11] They were also used in building the characteristic granaries used by these Indians for storing the various seeds used by them for food.

Of these food supplies the fruit of the palm was an important part. It was eaten fresh, and also dried for preservation. A favorite method of preparing the dried fruit was by triturating it with water

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[11] The stems of a grass, *Epicampes rigens*, was the material commonly used for this purpose. I have never seen a basket in the construction of which palm leaves had entered.

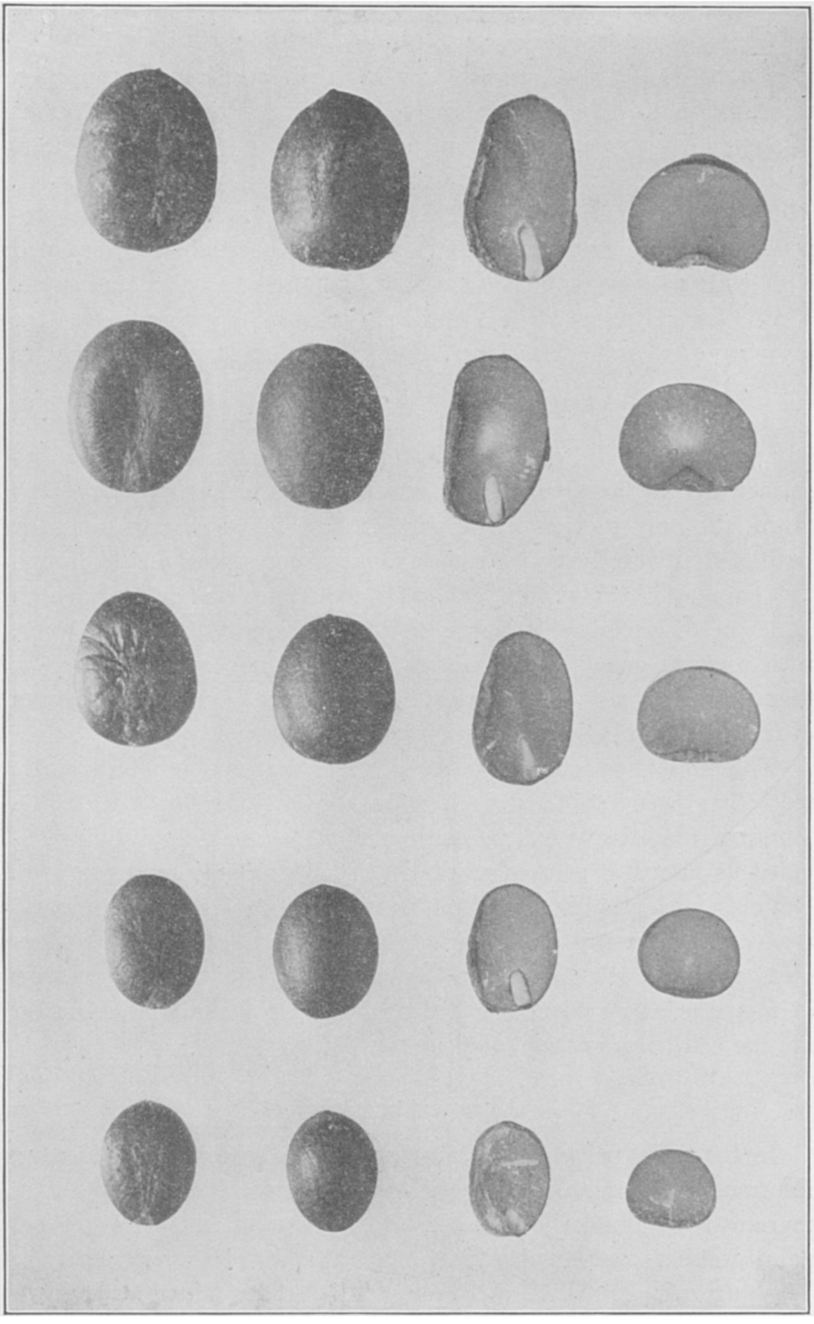

FIG. 12.—Seeds of Washingtonia; all ×3; *1* (bottom row), *W. filifera microsperma*, 4.8–5.8×3.5–4$^{\mathrm{mm}}$; *2*, *W. filifera*, 5.8–6×4–4.5$^{\mathrm{mm}}$; *3*, *W. gracilis*, 6–7×4.8–5.3$^{\mathrm{mm}}$; *4*, *W. filifera robusta*, 7–8×5.5–6$^{\mathrm{mm}}$; *5*, *W. sonorae*, 7–8.5×5.5–6.5$^{\mathrm{mm}}$.

in a stone mortar until a pulpy mass, rich in saccharine properties, was produced. The seeds were then separated and the pulp was thickened with meal made from pounded "chia" (Salvia), or grass seed, or pine nuts. The bony seed itself was pounded into meal, which Dr. EDWARD PALMER ('78), who seems to have tried it, pronounces "not inferior to cocoanut," a statement which may be accepted with some reservation. The terminal bud also was baked and eaten. The Coahuilla name of the palm is *Mau-wal.* Each grove was the property of a particular clan, to whom alone belonged the right to gather the fruit.

An insect enemy.—The desert palm is not known to be infested by any parasitic fungus, or to be subject to any bacterial infection. Its sole enemy is the larva of a Bostrychide beetle, *Dinapate Wrightii* Horn, the only species of the genus. The female oviposits at the base of the living leaves, whence the larva bores downward through the trunk, its continually enlarging galleries becoming at length 18^{mm} in diameter. These are tightly packed, for the most part, with rejected gnawings. The larval life of the insect is three or four years, perhaps even longer. The mature beetle has a length of fully 5^{cm} and is the heaviest North American coleopter.

The number of contemporaneous larvae that may inhabit a single trunk has been estimated as high as 200 or 300; but Mr. W. G. WRIGHT, who discovered the beetle, and who has assiduously investigated its habits, is of opinion that it would probably not exceed 50. But even such a horde of huge and voracious grubs, in their comparatively long life, might riddle a whole trunk with their galleries. They seem not to work any great destruction to the groves, however; in fact, the only evidences of their presence to the ordinary observer are the exit holes in dead trunks.

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SAN BERNARDINO
CALIFORNIA

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